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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/024,208	12/21/2001	David J. Cooperberg	015290-546	9076

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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 12/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/024,208

Applicant(s)

COOPERBERG ET AL.

Examiner

Luz L. Alejandro

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 16-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election of group I in Paper No. 8 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 16-38 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 8.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ni et al., WO 00/41212 in view of Fujii et al., U.S. Patent 4,980,204.

Ni et al. shows the invention substantially as claimed including a plasma processing system used for etching or CVD comprising: a plasma processing chamber 10; a vacuum pump connected to outlet 15 of the processing chamber; a substrate support 12 on which a substrate 13 is processed within the processing chamber; a dielectric member 20 having an interior surface facing the substrate support, wherein the dielectric member forms a wall of the processing chamber; a gas injector 22 extending through the dielectric member such that a distal end of the gas injector is exposed within the processing chamber, the gas injector having a planar axial end-face and including a plurality of gas outlets supplying process gas at a sonic or supersonic velocity (see page 16, lines 14-15) and injecting the process gas toward a primary plasma generation zone, the gas injector including a single on-axis outlet and a plurality of off-axis outlets in a side surface of the gas injector (see, for instance, Fig. 3A) and being removably mounted in the dielectric window (see page 13, lines 20-25); and an RF energy source 18 comprising an RF antenna in the shape of a planar or non-planar spiral coil which inductively couples RF energy through the dielectric member and into the chamber to energize the process gas into a plasma state to process the substrate (see fig. 1 and page 9, line 8 to page 10, line 25).

Ni et al. fails to expressly disclose the gas injector including a plurality of gas outlets supplying gas at flow rates that are independently varied between at least some of the outlets in the injector, specifically, between the on-axis and the off-axis outlets. Fujii et al. discloses using independent outlets 111,112,113,114 that are independently varied between gas flow control valves 13,14,15,16 and that come from a main outlet 20 (see Figs. 3-8 and col. 4-line 23 to col. 8-line 12). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ni et al. so as to include independent flow control for each of the outlets of the injector as suggested by Fujii et al. because this will allow for improved controllability and uniformity of the process being conducted within the chamber.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ni et al., WO 00/41212 in view of Fujii et al., U.S. Patent 4,980,204 as applied to claims 1-14 above, and further in view of Powell et al., U.S. Patent 6,287,643.

Ni et al. and Fujii et al. are applied as above but fail to expressly disclose wherein the gas injector is further provided with an electrically conducting shield which minimizes plasma ignition within gas passages located in the gas injector. Powell et al. discloses a gas injection tube 84 provided with an electrically conducting shield (see col. 9, lines 33-50) that minimizes plasma ignition until the gas reaches the main chamber (see Fig. 5 and col. 7-line 57 to col. 9-line 50). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the injector of the apparatus of Ni et al. modified by Fujii et al. with an

electrically conducting shield so as to minimize plasma ignition within the injector because plasma ignition within the injector can result in detrimental effects such as damage to the injector as well as uniformity problems with processing within the chamber.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ni et al., WO 00/41212 in view of Ishihara et al., U.S. Patent 5,160,543.

Ni et al. shows the invention substantially as claimed including a plasma processing system used for etching or CVD comprising: a plasma processing chamber 10; a vacuum pump connected to outlet 15 of the processing chamber; a substrate support 12 on which a substrate 13 is processed within the processing chamber; a dielectric member 20 having an interior surface facing the substrate support, wherein the dielectric member forms a wall of the processing chamber; a gas injector 22 extending through the dielectric member such that a distal end of the gas injector is exposed within the processing chamber, the gas injector having a planar axial end-face and including a plurality of gas outlets supplying process gas at a sonic or supersonic velocity (see page 16, lines 14-15) and injecting the process gas toward a primary plasma generation zone, the gas injector including a single on-axis outlet and a plurality of off-axis outlets in a side surface of the gas injector (see, for instance, Fig. 3A) and being removably mounted in the dielectric window (see page 13, lines 20-25); and an RF energy source 18 comprising an RF antenna in the shape of a planar or non-planar spiral coil which inductively couples RF energy through the dielectric member and into

the chamber to energize the process gas into a plasma state to process the substrate (see fig. 1 and page 9, line 8 to page 10, line 25).

Ni et al. fails to expressly disclose the gas injector including a plurality of gas outlets supplying gas at flow rates that are independently varied between at least some of the outlets in the injector, specifically, between the on-axis and the off-axis outlets. Ishihara et al. discloses using independent outlets 309, 310 that are independently varied between gas flow control valves 301d, 302d, 303d, 304d, 305d (see Figs. 1-4, and for example fig. 3, and their descriptions). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ni et al. so as to include independent flow control for each of the outlets of the injector as suggested by Ishihara et al. because this will allow for improved controllability and uniformity of the process being conducted within the chamber.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ni et al., WO 00/41212 in view of Ishihara et al., U.S. Patent 5,160,543, as applied to claims 1-14 above, and further in view of Powell et al., U.S. Patent 6,287,643.

Ni et al. and Ishihara et al. are applied as above but fail to expressly disclose wherein the gas injector is further provided with an electrically conducting shield which minimizes plasma ignition within gas passages located in the gas injector. Powell et al. discloses a gas injection tube 84 provided with an electrically conducting shield (see col. 9, lines 33-50) that minimizes plasma ignition until the gas reaches the main chamber

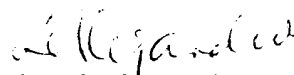
(see Fig. 5 and col. 7-line 57 to col. 9-line 50). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the injector of the apparatus of Ni et al. modified by Ishihara et al. with an electrically conducting shield so as to minimize plasma ignition within the injector because plasma ignition within the injector can result in detrimental effects such as damage to the injector as well as uniformity problems with processing within the chamber.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Luz L. Alejandro
Patent Examiner
Art Unit 1763

December 2, 2002December 2, 2002